

Polarization beam splitter based on photonic crystals of negative refraction

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Polarization beam splitter is an important device in optical systems. Several types of polarization beam splitters based on photonic crystals have been reported recently, utilizing the different bandgaps [1] or anisotropy [2] for two polarizations. In this paper we present a design of polarization beam splitters based on negative refraction [3] in photonic crystals.

A two-dimensional metallo-dielectric photonic crystal of negative refraction is designed for the application of polarization beam splitters. To match the refractive index of air, the effective refractive index of the photonic crystal is designed to be -1 for TE-polarization and +1 for TM-polarization. Two different types of polarization beam splitters are presented. Both polarizations are in transmission mode, and the beam of TE-polarization goes through a negative refraction and the beam of TM-polarization goes through a positive refraction.

[1] S. Kim, *et al.*, Opt. Lett. **28**, 2384 (2003).

[2] L. J. Wu, *et al.*, Opt. Lett. **29**, 1620 (2004).

[3] M. Notomi, Phys. Rev. B **62**, 10696 (2000).